L 47171-66

ACC NR: AT6028379 SOURCE CODE: UR/0000/65/000/000/0142/0154 15

AUTHOR: Bachin, A. P.; Bekzhanov, G. R.; Brodovoy, V. V.; Gol'dshmidt, V. I.; Zhivoderov, A. B.; Zlavdinov, L. Z.; Ivanov, O. D.; Klenchin, I. N.; Kolmogorov, Yu. A.; Kotlyarov, V. M.; Kuz'min, Yu. I.; Kuminova, M. V.; Kunin, N. Ya.; Lyubetskiy, V. G.; Melent'yev, M. I.; Morozov, M. D.; Tret'yakov, V. G.; Tychkova, T. V.; Tsaregradskiy, V. A.; Eydlin, R. A.

ORG: none

TITLE: Geophysical sketch map of Kazakhstan

SOURCE: International Geological Congress. 22d, New Delhi, 1964. Geologicheskiye rezul'taty prikladnoy geofiziki (Geological results of applied geophysics); doklady sovetskikh geologov, problema 2. Moscow, Izd-vo Nedra, 1965, 142-154

TOPIC TAGS: ~~Kazakhstan~~ geophysics, map, ~~geophysical mapping~~, tectonics ~~...~~ regional study

ABSTRACT: On the basis of regional geophysical and geological investigations (seismic, gravimetric, magnetoelectric), a composite geophysical sketch map of the physical fields of Kazakhstan has been compiled. From this map, the major tectonic zones, deep structures, and geological structural zones are defined. Long zones representing high field gradients in the gravitational and magnetic fields reflect deep geosutures, which seismic sounding data suggest are scarps in the M-discontinuit

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APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00041231(

ACC NR: AT6028379

Among the major structural zones of Kazakhstan defined are: 1) the Turgayskaya, 2) the Petropavlovskaya, 3) the Uspenskaya, 4) the Tokrauskaya, and 5) the Dzhalair-Naymanskaya. Regions of magmatism are also defined. In the tectonic depression zones, contour lines indicate the thickness of the sedimentary cover, overlying the folded basement, and possible oil-bearing formations. Orig. art. has: 1 figure. [DM]

SUB CODE: 08/ SUBM DATE: 06Jan65/ ATD PRESS: 5063

Card 2/2

ANDREYEV, A.P.; BRODOVOY, V.V.; GOL'DSHMIDT, V.I.; KUZ'MIN, Yu.I.; MOROZOV, M.D.; EYDLIN, R.A.

Distribution of deep faults in Kazakhstan. Izv. AN Kazakh. SSR. Ser. geol. 22 no.4:11-17 Jl-Ag '65. (MIRA 18:9)

ACC NR: AR6032146 SOURCE CODE: UR/0169/66/000/006/G005/G005

1

AUTHOR: Andreyev, A. P.; Brodovoy, V. V.; Gol'dshmidt, V. I.; Kuz'min, Yu. I.; Morozov, M. D.; Eydlin, R. A.

TITLE: Abyssal tectonic zoning of the territory of Kazakhstan according to geophysical data

SOURCE: Ref. zh. Geofizika, Abs. 6G32

REF SOURCE: Sb. Geofiz. issled. v Kazakhstane. Alma-Ata, Kazakhstan, 1965, 9-27

TOPIC TAGS: geophysics, geology, geographic location, tectonics, earth crust

ABSTRACT: A description is given of the sequential development of the geological interpretation of geophysical data, from factual material to maps of the abyssal structure of the earth's crust and the typification of its individual blocks, the quantitative characteristics of the abyssal fractures, and the development of a system of geotectonic zoning. It is shown that the Moho discontinuity (M) was built according to graphoanalytic correlation dependencies between zonal anomalies and the delineation of the M boundary, and studied according to deep seismic

Card 1/3 UDC: 550.311(574)

ACC NR: AR6032146

sounding and deep seismic profiling. An isodepth system of the "basalt" and "diorite" surface layers was built. Knowledge of the delineation of the M surface makes it possible to construct systems of isopachous lines of the "basalt" layer. A simultaneous analysis of the Moho and Conrad discontinuities provides data for the definition of the structure of the earth's crust in various regions. The coefficient of basalt saturation (K_b), equal to the relation between the thickness of the "basalt" layer and the general thickness of the earth's crust, is used to define individual blocks. Earth-crust blocks of similar structure are defined by similar coefficient values (0.77 and 0.67 for the Akbastau and Kokchetav massifs, respectively, 0.38 for the Russian platform, etc.) The simultaneous analysis of the definition of the core of interfaces makes it possible to suppose that zonal anomalies can be caused by a possible heterogeneity in the density of the mantle. Maps of anomalous magnetic fields, gamma fields, etc., and geological information are brought out to study the structure of the "granite" layer aside from the gravitation field. The authors synthesize the data obtained and work out regional tectonic delimitations of areas of intrusive magnetism, abyssal fractures, deep-seated faults, preorogenic synclinales, foredeeps, intermountain depressions, superimposed troughs, etc. The deep faults are divided into 4 groups: those reflected in the M surface; those not reflected in it, but controlled by ultrabasite belts; those manifested in the "basalt" layer; and those dying out in the "granite"

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ACC NR: AR6032146

and "diorite" layers. The structure of the basic geotectonic blocks of the Kazakhstan-Caspian tectonic syncline, group of ancient rigid folding structures, including the Kokchetav, Balkhash, Akbastau, Slavgorod, and Aral blocks, and areas of Caledonian and Hercynian folding. It is shown that the faults of the first group are concentrated mainly in eastern Kazakhstan; the displacement of blocks contacting under it reaches 5—7 km, while the extension reaches 500—1000 km. The faults of the second group are oriented mainly in the north-east and meridional directions. They are widespread, as are those of the third and fourth groups. The complex tectonic-formation block structure of Kazakhstan is caused by the coincidence of the main abyssal faults. The bibliography contains 28 entries. G. Reysner. [Translation of abstract]

SUB CODE: 08/

Card 3/3

ACC NR: AP7004554 SOURCE CODE: UR/0215/66/000/006/0034/0047

AUTHOR: Andreyev, A. P.; Brodovoy, V. V.; Gol'dshmidt, V. I.; Kuz'min, Yu. I.; Morozov, M. D.; Eydlin, R. A.

ORG: Kazakh Geological Trust (Kazakhskiy geologicheskiy trest)

TITLE: Deep tectonic regionalization of kazakhstan on the basis of geophysical data

SOURCE: Sovetskaya geologiya, no. 6, 1966, 34-47

TOPIC TAGS: tectonics, earth crust / Kazakhstan

ABSTRACT:
All available data are reviewed for the purpose of tectonic regionalization of Kazakhstan. In particular, observations along a series of profiles with a total length of 4,600 km were used. A merit of the article is that the authors describe exactly how all materials were used in regionalizing the area, and the study could be used as a model for regionalization of other areas on the basis of equivalent information. The graphic representation of the generalized data is particularly clear and easily interpreted. Fig. 2 shows analysis of the gravity field over columns of the earth's crust of identical thickness in different areas; Fig. 2 effectively shows the generalized characteristics of the deep structure of the principal tectonic blocks of Kazakhstan; Fig. 4 is a composite map of the distribution of deep faults and areas of intrusive magmatism in Kazakhstan; Fig. 5 is a map of the tectonic regionalization on the basis of geological-geophysical data. Orig. art. has: 5 figures. [JPRS: 38,460]

SUB CODE: 08 / SUBM DATE: none / ORIG REF: 018 UDC: 550.3:551.24(574)

Card 1/1 0936 1383

ACC NR: AR6024837 SOURCE CODE: UR/0169/66/000/004/G003/G004

AUTHOR: Bekzhanov, G. R.; Brodovoy, V. V.; Gol'dshmidt, V. I.; Zhivoderov, A. B.; Zlavdinov, L. Z.; Ivanov, O. D.; Klechin, I. N.; Kolmogorov, Yu. A.; Bachin, A. P.; Kotlyarov, V. M.; Kuz'min, Yu. I.; Kuminova, M. V.; Kunin, N. Ya.; Lyubetskiy, V. G.; Melent'yev, M. I.; Morozov, M. D.; Tret'yakov, V. G.; Tychkova, T. V.; Tsaregradskiy, V. A.; Eydlin, R. A.

TITLE: A schematic geophysical map of Kazakhstan

SOURCE: Ref. zh. Geofizika, Abs. 4G17

REF SOURCE: Sb. Geol. rezul'taty prikl. geofiz. Geofiz. issled. stroyeniya zemn. kory. M., Nedra, 1965, 142-154

TOPIC TAGS: geologic survey, geologic prospecting, map

ABSTRACT: Regional geophysical surveys are conducted in Kazakhstan to divide the territory into tectonic regions, to study its plutonic structure, and to solve some problems of geophysical mapping. The results of these surveys will make it possible to establish structural belts and regions in which minerals are likely to be found. The basic material will be obtained from investigations of the magnetic and gravitational fields in combination with seismic studies. In the magnetic and gravitational fields, tectonic and plutonic seams are isolated which correspond to terraces in the

Card 1/2 UDC: 550.311(574)

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00041231(

ACC NR: AR6024837

Mohorovicic discontinuity. Methods of regional geophysics are used to study the plutonic structure of a folded base, the structure and thickness of sedimentary sheaths, and to indicate prospective petroleum bearing uplifts. [Translation of abstract]
M. Speranskiy

SUB CODE: 08

Card 2/2

EYDLIN, YE. K.

AUTHORS: Sachkov, D.D., Eydlin, Ye.K.

TITLE: Calculation and Design of Radio Equipment (Raschet i konstruirovaniye radioapparatury)

PUB. DATA: Gosudarstvennoye energeticheskoye izdatel'stvo, Moscow - Leningrad, 1957, 448 pp., 25,000 copies

ORIG. AGENCY: None given

EDITOR: Nikolas, M.N.; Tech. Ed: Larionov, G.Ye.

PURPOSE: Recommended as a textbook by the Administration of Special Secondary Schools of the Ministry of Higher Education of the USSR for students of technical schools of the radio engineering industry.

COVERAGE: The book sets forth the problem of designing various categories of mass-produced radio equipment taking into account operational requirements. Methods of constructional design of the component parts of radio equipment are presented and examples of designing various installations are given. Special attention is

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Calculation and Design of Radio Equipment (Cont.)

devoted to methods guaranteeing a high level of production. The method suggested of calculating tolerances (see Ch. 2) appears for the first time in the technical literature, according to the authors. It is assumed that the reader has a general, knowledge of technical subjects like the principles of radio engineering, radio transmitters, production processes of radio equipment, radio measurements, and others. No personalities are mentioned. There are 29 references, 28 of which are Soviet and 1 is a translation. This book can also be used by radio manufacturing plant designers.

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Calculation and Design of Radio Equipment (Cont.)

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Calculation and Design of Radio Equipment (Cont.)

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Calculation and Design of Radio Equipment (Cont.)

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Calculation and Design of Radio Equipment (Cont.)

9-7. Automation of radio equipment production 438

BIBLIOGRAPHY: 447-448

AVAILABLE: Library of Congress

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APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00041231(

15-57-8-11538

Translation from: Referativnyy zhurnal, Geologiya, 1957, Nr 8, pp 207-208 (USSR)

AUTHOR: Eydman, I. Ye.

TITLE: Electrical Logging Parameters (Ob elektrokarottazhnykh parametrakh)

PERIODICAL: Prikl. geofizika, Nr 14, 1956, pp 156-188.

ABSTRACT: The author considers some questions regarding the parameters of spontaneous polarization (PS). He proposes to adopt the value of the potential within a pure sandstone deposit for zero on the PS diagram and to subtract this value from the values of the potential within each of the strata in order to determine the corresponding values for SP. Furthermore, since the value of PS depends on the conditions of measurement and primarily on the correlation of the mineralization of the saline solutions involved, he suggests determination of the coefficient K_{ps} (quotient of the division of the value PS by the logarithm of the relative

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15-57-8-11538

Electrical Logging Parameters (Cont.)

concentrations of the solutions). The problem of the physical and chemical nature of the PS potential is also discussed.

Card 2/2 V. M. Gol'dberg

15-57-10-14615

Translation from: Referativnyy zhurnal, Geologiya, 1957, Nr 10, p 208 (USSR)

AUTHOR: Eydman, I. Ye.

TITLE: Resistivity (Udel'noye elektricheskoye soprotivleniye)

PERIODICAL: Prikl. geofizika, Nr 15, 1956, pp 140-154

ABSTRACT: In interpreting electrical logs the relative resistivity, F(formation factor) is used. This property is the ratio of rock resistivity to resistivity of the water impregnating the rock. Laboratory experiments show that, in the majority of rocks, the value of the formation factor increases with increased mineralization in the water impregnating the rock, up to some limiting value at which the factor becomes infinite. This phenomenon is associated with surface conductivity of the rock, the value of which depends on the mineralization of the water in the rock and on its distribution through the rock. The coefficient of surface conductivity is $k_s = F_\infty/F$. For a rock sample impregnated with

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relationships of the oleophilic and hydrophilic components in the rock, and also on the mineralization of the formational water. These factors explain the variation in the coefficient of resistivity-increase in different regions having rocks with identical oil saturation.

N. A. Per'kov

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15-57-8-11540

Translation from: Referativnyy zhurnal, Geologiya, 1957, Nr 8, p 208 (USSR)

AUTHOR: Eydman, I. Ye.

TITLE: The Nature of the Membrane Activity of Various Basic Sedimentary Rocks in the Lower Volga District (O karaktere membrannoy aktivnosti osnovnykh raznovidnostey osadochnykh porod Nizhnego Povolzh'ya)

PERIODICAL: Prikl. geofizika, Nr 15, 1956, pp 155-168.

ABSTRACT: The author had determined the coefficient of membrane activity, $K_{ps} = K_m + K_d$, for sedimentary rocks of the Lower Volga district. These determinations were obtained from laboratory measurements on rock samples of various lithologic compositions obtained in core drillings in this district. K_m and K_d are the coefficients of membrane and diffusional potentials, measured at the contact of the samples carrying NaCl solutions with concentrations of 0.2 normal and 0.02 normal. K_{ps} varies from -20 to + 69 mv; its magnitude,

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15-57-8-11540

The Nature of the Membrane Activity of Various Basic (Cont.)

in the author's opinion, is determined by the specific electrical charge of the rock, that is, the surface density of the charge in the diffusion layer and the specific surface of the rock. The K_{ps} of sandstones varies from 0 to +54 mv, but the most probable values are within the limits of 10 mv to 15 mv. The K_{ps} of siltstones varies from +9.5 to + 63 mv with the predominance of values within the limits of 30 mv to +50 mv; the curve of distribution of the K_{ps} values for argillaceous rocks has a maximum of about +50 mv. The K_{ps} of sandstones and siltstones increases with an increase in their clay content. The K_{ps} of argillaceous rocks increases with depth, as a result of the increase in density of the rocks with depth. Values of the coefficient of membrane activity close to zero (-15 mv to 0 mv) are characteristic of pure limestones and dolomites. The author explains this by their low surface charge (which is less than that of clays) and also by their dispersion and the presence in the carbonate rock of pores of large diameter. Positive values of K_{ps} are characteristic of carbonate rock which contains an admixture of clay particles. It has been shown that there is no

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15-57-8-11540

The Nature of the Membrane Activity of Various Basic (Cont.)

relation between the value K_{ps} and the lithologic characteristics of carbonate rock. It also does not appear possible to distinguish limestones from dolomites by their value of K_{ps}. The compiled data lead the author to conclude that the presence of a minimum PS at the stratum of carbonate rock is characteristic not only for traps but also for dense rocks of low permeability. Maximum values of PS correspond to impermeable carbonate rocks. Comparison of the values of K_{ps} for various specimens of sandstone with their porosity and texture shows the absence of a regular relation between these characteristics. Hence it is possible to determine the porosity and permeability of rocks from their PS curves under a given set of conditions.

N. A. Per'kov

Card 3/3

EYDMAN, I. Ye. Cand Geol-Min Sci — (diss) "On the Character of the Electrical core Sampling Parameters of Rock ~~Cores in~~ of the Saratow ~~Region of the Volga.~~ Povolzh'ye." Saratow, 1957. 26 ~~xx~~ pp 20 cm. ~~XXXX~~ (Saratow State Univ im. N. G. Chernyshevskiy), 100 copies (KL, 25-57, 110)

EYDMAN, I.Ye.

EYDMAN, I.Ye.; ROMANOVA, V.G.; SOBOL'KIN, S.Ya.

Evaluating the salinity of underground waters on the basis of hydrogeological well logging. Razved.i prom.geofiz.no.17:79-83 '57. (MIRA 10:12)

(Borings) (Water, Underground)

EYDMAN, I. Ye.; FINKEL'SHTEYN, S.N.

Determining the properties of carbonate reservoir rocks by geophysical methods. Prikl. geofiz. no.28:145-154 '60. (MIRA 14:3)

(Volga Valley--Oil well logging, Electric)
(Rocks, Carbonate)

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00041231(

IVANOV, A.I.; EYDMAN, I.Ye.

Formation of screens in oil and gas accumulations. Geol.nefti i gaza 4 no.7:24-29 Je '60. (MIRA 13:8)

1. Nizhnevolzhskiy filial Vsesoyuznogo nauchno-issledovatel'skogo geologo-razvedochnogo neftyanogo instituta.
(Volga Valley--Petroleum geology)

EYDMAN, I.Ye.; MARTYNOV, Yu.M.

Evaluation of the oil and gas potentials of Paleozoic carbonate reservoir rocks as revealed by a study in the Volga Valley portion of Saratov Province. Trudy NVNIIGG no.1:137-145 '64.
(MIRA 18:6)

EYDMAN, V. Ya.

USSR/Nuclear Physics - Penetration of Charged and Neutral Particles Through Matter,
C-6

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 34097

Author: Eydman, V. Ya.

Institution: Gor'kiy University, Gor'kiy, USSR

Title: On the Cherenkov Radiation of a Particle Having a Dipole Magnetic Moment

Original Periodical: Uch. zap. Gor'kovsk. un-ta, 1956, 30, 229-235

Abstract: The Cherenkov radiation of a particle having a dipole magnetic moment is treated in the nonrelativistic approximation with the aid of the Hamilton method. In the classical case, the well-known results are obtained (I. M. Frank, Collection "Memorial to S. I. Vavilov," 1952, page 172). In the quantum case, the possibility of changing the direction of the spin of the particle during radiation is allowed for (the spin is assumed to be 1/2). The ratio of the intensities of the radiation with and without change in the spin direction turned out to be on the order of v^2/c^2.

1 of 1

EYDMAN V YA

AUTHOR: Eydman, V. Ya. 56-1-21/56

TITLE: Radiation of an Electron Moving in a Magnetoactive Medium (Izlucheniye elektrona, dvizhushchegosya v magnitoaktivnoy plazme).

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1958, Vol. 34, Nr 1, pp. 131-138 (USSR).

ABSTRACT: The present paper investigates the spectral and angular distribution of the energy radiated by an electron, when it moves in a magnetoactive medium. At the beginning, reference is made to publications dealing with the same subject. The magnetic field accelerating the electron renders the medium magnetoactive. The anisotropy occuring in the plasma in such a case can be great. The problem of the radiation of the electron moving in a gyrotropic medium must be solved on these conditions. The present paper solves this problem by means of Hamilton's method. At the outset Maxwell's equations are given for the charge e moving along an helix in a magnetic field. The vector potential of the radiation field can be determined by solving a system of oscillation equations. The total energy of the radiation of the j-th normal wave can be

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Radiation of an Electron Moving in a Magnetoactive Medium 56-1-21/56

represented by a sum. According to the formulae found here radiation is possible also, if s = 0 (zero harmonic). An expression is also written down for the Cherenkov radiation. Subsequently the author investigates the harmonics differing from zero and the character of the radiation corresponding to the great harmonics. The corresponding expression for the spectral density of the radiation is written down and discussed. Finally the radiation corresponding to the great harmonics is investigated. There are 2 figures and 12 references, 12 of which are Slavic.

ASSOCIATION: Gor'kiy Radiophysical Institute (Gor'kovskiy radiofizicheskiy institut).

SUBMITTED: July 11, 1957

AVAILABLE: Library of Congress

Card 2/2

24(5) SOV/56-35-6-28/44

AUTHORS: Ginzburg, V. L., Eydman, V. Ya.

TITLE: On the Cherenkov Radiation of Dipole Moments (O Cherenkovskom izluchenii dipol'nykh momentov)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 6, pp 1508-1512 (USSR)

ABSTRACT: Bunches of particles with dimensions sufficiently small with respect to the wave length in the medium give the same Cherenkov radiation as point particles with a corresponding charge and multipole moments. Therefore, the investigation of the Cherenkov radiation of magnetic and electric dipoles is of interest irrespective of the fact that it is only very weak for separated particles (electrons, neutrons). With respect to the question of the Cherenkov radiation of the magnetic moment, contradictory opinions are, however, found to be expressed in publications (Refs 1-6). In this connection the authors developed a calculation method, which differs somewhat from that used in earlier papers (Refs 2-4). It is first developed for the Cherenkov radiation of electric and magnetic dipoles moving in a continuous medium, and further for that of dipoles moving in channels or gaps ($\varepsilon = \mu = 1$).

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The case in which ε and μ are different from 1 is finally discussed. The authors thank L. S. Bogdankevich, A. V. Gaponov, M. A. Miller and I. M. Frank for discussions. There are 12 references, 11 of which are Soviet.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute imeni P. N. Lebedev of the Academy of Sciences, USSR) Gor'kovskiy gosudarstvennyy universitet (Gor'kiy State University)

SUBMITTED: June 27, 1958

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00041231(

EYDMIN, V. Ya., Cand of Phys-Math Sci — (diss) "The Force of Radiation in the Flight of a Shell in the Atmosphere," Gor'kiy, 1959, 8 pp (Gor'kiy State Univ im N. I. Lobachevskiy) (KL, 5-60, 123)

24.6820

67524
SOV/141-2-3-1/26

AUTHORS: Ginzburg, V.L. and Eydman, V.Ya.

TITLE: On Some Peculiarities of Electromagnetic Waves Radiated by Particles Moving Faster Than Light

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, 1959, Vol 2, Nr 3, pp 331 - 343 (USSR)

ABSTRACT: The paper was presented at the Ministry of Higher Education Conference on Radio-electronics, Kiyev, 1959. The classical treatment of this problem yields the Vavilov-Cherenkov radiation condition in:

$$\cos \Theta_0 = c/n(\omega)v \qquad (1)$$

where Θ_0 is the angle between the particle velocity $\bar{v}$ and the wave-vector $\bar{k}$ of the Cherenkov wave, $n(\omega)$ is the refractive index at the frequency ω, the medium being isotropic. In this paper quantum representations are used because they are so fruitful of interesting results. The fundamental conclusion is that for particles moving faster than light the reaction force of the radiation, changing the amplitude of particle vibration,

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SOV/141-2-3-1/26

On Some Peculiarities of Electromagnetic Waves Radiated by Particles Moving Faster Than Light

is less compared with that for velocities less than light and, in an anisotropic medium, can even change sign. The force corresponds, therefore, not to "friction" but to an excitation of the vibrations. This effect is obviously directly connected to the instability of faster-than-light particle beams. A point charge moving uniformly in an isotropic medium radiates energy, as a result of the Vavilov-Cherenkov effect, at a rate given by Eq (2). If the radiated frequency is ω_0, then as a result of the Doppler effect, the apparent frequency at an angle Θ is given by Eq (3). Within the so-called Cherenkov cone the Doppler effect is anomalous since ω increases with Θ and, if n is constant, $\omega \to \infty$ when $\Theta \to \Theta_0$. In practice, the effect is of interest for particle beams passing through narrow slots or close to delaying systems or for beams in magneto-active plasma where the losses are low. From a quantum point of view, the kinematics of radiation are determined by the laws of conservation of

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SOV/141-2-3-1/26

On Some Peculiarities of Electromagnetic Waves Radiated by Particles Moving Faster Than Light

energy and momentum. The changes in energy and momentum as a result of radiation are given in Eqs (4) and (5), respectively. A system which moves uniformly in vacuo can only radiate as a result of a change in its interval state (thus, for example, an electron cannot radiate in vacuo if moving uniformly). In the general case, when $n \neq 1$, the radiation condition, in quantum terms, is that given by Eq (6). The advantage of the latter representation is that it shows the normal Doppler effect to involve an energy transition from an upper to a lower level, while the anomalous effect requires the reverse transition. A system which has only two discrete energy levels can exhibit both kinds of Doppler effect. In systems with many energy levels the anomalous effect leads to the possibility of exciting transverse radiation. Two cases exist, corresponding to an increase and decrease, respectively, of the system energy. The calculation of the transition probabilities which determine how a system will behave may be carried out by classical means; quantum methods

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SOV/141-2-5-1/26

On Some Peculiarities of Electromagnetic Waves Radiated by Particles Moving Faster Than Light

offer no advantage. The absorption coefficient, in the "normal" process, is that given by Eq (9) while the anomalous value is Eq (10). The latter expression is useful where the production of microwaves is considered. In particular, the case of a magneto-active plasma medium is applicable to sporadic solar radiation. In an anisotropic medium the phase and group velocities of a wave need not have the same direction. Figure 2 shows the effect of the sign of $d\omega/dk_r$ on the generation of the Cherenkov radiation.

As a rule, the radiation forces are small compared with the retarding forces but may become significant when motion occurs in narrow channels or in plasma.

There are 2 figures and 26 references, 25 of which are Soviet and 1 Hungarian.

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On Some Peculiarities of Electromagnetic Waves Radiated by Particles Moving Faster than Light

ASSOCIATION: Issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete (Radiophysics Research Institute of Gor'kiy University)

SUBMITTED: February 25, 1959

Card 5/5

24(5)

AUTHORS: Ginzburg, V. L., Eydman, V. Ya. SOV/56-36-6-28/66

TITLE: The Radiative Force For a Charge Moving in a Medium (O sile reaktsii izlucheniya pri dvizhenii zaryada v srede)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 6, pp 1823-1833 (USSR)

ABSTRACT: In the present paper the radiative force for a non-punctiform charge moving in a generally anisotropic and gyrotropic medium is investigated. The radiative force in a medium may play a considerable role when the particle moves in a magnetoactive plasma, in channels and slits in dielectrics and also in wave guides. At velocities larger than the phase velocity of light in the medium the radiative force, which changes the amplitude of the oscillations and which is related to the emission of anomalous Doppler frequencies, possesses a different sign than that of radiative friction due to the emission of normal Doppler frequencies. The total radiative force which is responsible for the change in the amplitude of the oscillations of a particle in an isotropic medium

The Radiative Force For a Charge Moving in a Medium SOV/56-36-6-28/66

corresponds to friction also in the case of super-light motion. However, this friction may be appreciably smaller than the radiative friction encountered at sublight velocities. In an anisotropic medium amplification of the oscillations may occur instead of friction. The decrease of radiative friction or the appearance of the amplification may be related to the peculiarities of the anomalous Doppler effect as revealed by a quantum mechanics analysis and also to the instability of the super-light particle beams. The theoretical considerations are based upon the results obtained by a large number of previous papers (Ginzburg et al), and, in the course of the final discussion, the resulting conclusions are discussed. There are 15 Soviet references.

ASSOCIATION: Radiofizicheskiy institut Gor'kovskogo gosudarstvennogo universiteta (Radiophysics Institute of Gor'kiy State University)

SUBMITTED: December 20, 1958

Card 2/2

EYDMAN, V.Ya.

Intensity of radiation reaction in magnetoactive plasma. Izv.vys.
ucheb.zav.; radiofiz. 3 no.2:180-191 '60. (MIRA 13:7)

1. Nauchno-issledovatel'skiy radiofizicheskiy institut pri
Gor'kovskom universitete.
(Plasma (Ionized gases))

S/141/60/003/02/003/025
E032/E314

AUTHOR: Eydman, V. Ya.

TITLE: Radiational Friction in Magneto-active Plasma 21

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, 1960, Vol 3, Nr 2, pp 192 - 198 (USSR)

ABSTRACT: The change in the trajectory of a particle moving in a plasma due to its emission of electromagnetic waves is of considerable interest in the theory of accelerators and certain other cases, for example, the motion of electrons in the solar corona. The presence of a medium can also have a considerable effect on the character of the motion of the charges. Thus, for example, in a magneto-active plasma in which the refractive index $n_j(\omega, \theta)$ can assume large values, there is the possibility that anomalous Doppler frequencies will be emitted even at very low particle translational velocities. This in its turn leads to a reduction in the damping force acting on the particle vibrations in the direction perpendicular to the constant magnetic field. The present paper gives a derivation of a formula for the force of radiational friction in a magneto-active plasma and a discussion is given of the effect of

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this force on the character of the motion of charged particles. Ginzburg and Eydman (Ref 1) have shown that the force of radiational friction in an arbitrary medium is given by Eq (1), where $\underline{R}(t)$ is the radius vector of the centre of mass of the particle, $\dot{\underline{R}} = \underline{v}(t)$, $\underline{R}' = \underline{R}(t')$, $v' = v(t')$, $k_{max} \approx 2\pi/r_o$, r_o is the radius of the electron, the frequency ω_j and the wave vector $\underline{k}$ are connected by the expression $\omega_j^2 n_j^2/c^2 = k^2$, θ and φ are the usual polar angles and $\underline{a}_j$ is a vector characterising the polarization of the j-th normal wave. In the case of a plasma, Eydman (Ref 2) has shown that $\underline{a}_j$ is given by the equation at the foot of p 192, where the parameters involved are defined by Eq (2) and N is the electron concentration in the plasma. On the other hand, the refractive index of a magneto-active plasma is given by Eq (3), in which the + sign refers to the ordinary wave and the - sign to the extraordinary wave. If the electron moves in a uniform magnetic field $\underline{H}_o$ then in the first approximation, i.e. when

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the change in the trajectory due to the radiational friction is neglected, it may be assumed that Eq (4) holds where R_o is the radius of the electron in the magnetic field $\underline{H}_o$ and v_o is the velocity component parallel to the field. In order to obtain an expression for the force of radiational friction, Eq (4) must be substituted into Eq (1) and this must be followed by an integration with respect to t' and φ. The result of this calculation is given by Eqs (5) and (6), where J_s and J'_s is the Bessel function and its derivative, respectively, and $\delta(y)$ is the delta function of the argument $y = \omega - s\Omega - kv_o \cos\theta$. The expression for the f_{yj} component is similar to that for f_{xj} except that $\sin(\Omega t)$ is replaced by $\cos(\Omega t)$. Since a delta function is present in the integrands of Eqs (5) and (6), the frequency of the emitted waves is given by the Doppler relations of Eq (7). The components in Eqs (5) and (6) with $s > 0$ correspond to normal Doppler

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frequencies, while those with $s < 0$ correspond to anomalous Doppler frequencies. It follows from Eq (3) that the refractive index becomes infinite on the curve defined by Eq (8), while the domain of the variables ω and θ for which the anomalous Doppler effect is possible is defined by Eq (9) (ordinary wave) and Eq (10) (extraordinary wave) when ω_o is less than ω_H and by Eqs (11) and (12) when ω_o is greater than ω_H. Figure 1 shows the domain of the variables ω and θ for which $n_j > 1$, i.e. the anomalous Doppler effect is possible. These regions are indicated by the shaded areas, the shading being different for the ordinary and extraordinary waves. The discussion is concluded with a detailed analysis of the expression for the force of radiational friction which is given by Eq (6). For simplicity, the discussion is limited to the case of oscillatory motion, for which $kR_o \ll 1$. Moreover, since the greatest contribution in Eqs (5) and (6) is due to components with $s = 0, \pm 1$, only components with $s = \pm 1$ are

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considered ($s = 1$ corresponds to normal Doppler frequencies and $s = -1$ to anomalous Doppler frequencies). The Cherenkov term $s = 0$ is not considered. If Eq (6) is integrated with respect to θ subject to the above approximations, the frictional components are found to be given by Eqs (14) and (15) and on substituting the expression for the refractive index into these equations it is found that $\cos^2\theta_{(\pm)}$ is given by Eqs (17) and (18), where the lower sign corresponds to anomalous Doppler frequencies. Since the integrands in Eqs (14) and (15) are essentially positive, it follows that f^{+}_{xj} is in antiphase with the velocity v_x, while f^{-}_{xj} is in phase with v_x. This means that the emission of normal Doppler frequencies gives rise to a reduction in the oscillatory energy of the particle, while the emission of anomalous Doppler frequencies tends to increase the oscillatory energy. In order to discover which of these takes place it is necessary to calculate the values

Card5/6 of $f^{\pm}_{xj}$ in each specific case. The paper is concluded VC

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with a numerical calculation of these quantities in the non-relativistic case. Acknowledgments are made to V.L. Ginzburg for suggesting the subject and for discussions and to M.N. Orzhekhovskaya for carrying out the numerical calculations. There are 2 figures and 5 Soviet references.

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete (Scientific-research Radiophysics Institute of Gor'kiy University)

SUBMITTED: July 16, 1959, initially;
December 20, 1959, after revision.

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27611

6,9417
3,1720 (1126,1127,1395)

S/141/61/004/002/003/017
E032/E114

AUTHORS: Benediktov, Ye.A., and Eydman, V.Ya.

TITLE: Non-coherent radio emission due to charged particles moving in the earth's magnetic field

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, 1961, Vol.4, No.2, pp. 253-258

TEXT: The present paper reports an estimate of the intensity of radiation emitted by fast charged particles in the earth's magnetic field on middle and long waves. The emission of electromagnetic waves by an electron moving in a magnetoactive plasma has been discussed in detail by the second of the present authors (Ref.4: V.Ya. Eydman, ZhETF, Vol.34, 131 (1958); Vol.36, 1335 (1959); Dissertatsiya, Gosuniversitet, Gor'kiy, 1960 (Dissertation, Gor'kiy State University)). A quantitative calculation of the intensity of this radiation is extremely difficult, even in the case of a uniformly distributed plasma. In the earth's atmosphere, both the magnetic field and the electron concentration vary with height so that the calculation is even more difficult. In view of this, the intensity can only be

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Non-coherent radio emission due to ... S/141/61/004/002/003/017
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estimated on the basis of simplifying assumptions. It is well known that the EM waves emitted by an electron moving through a magnetoactive plasma can be divided into two components, namely the synchrotron component and the Cherenkov component. The first of these predominates when $v_{\parallel}/v_{\perp} \ll 1$, $(v_{\perp}/c)n_j(\omega, \theta) \ll 1$, while the second component predominates when $v_{\parallel}/v_{\perp} \gg 1$. $v_{\parallel}$ and $v_{\perp}$ are respectively the parallel and perpendicular velocity components relative to the magnetic field, and n_j is the refractive index of the j-th normal wave. The present authors discuss these two components as follows.

1. Cherenkov radiation. Consider a beam of charged particles, all moving with the same velocity v. Neglecting reabsorption, and assuming that the total intensity is equal to the sum of the individual intensities due to the separate particles, the intensity averaged over a hemisphere is given by

$$J = \frac{1}{2\pi} \int_{z_1}^{z_2} q v_{\parallel} \, w \, dz \qquad (1)$$

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In this expression edge effects are neglected, q is the beam density and w is the intensity emitted by a particle per unit path-length. The integration limits are determined from the condition

$$\cos^2\vartheta \leq 1, \tag{2}$$

where

$$w = \frac{e^2}{2c^2}\int \left| \frac{(\omega^2 - \omega_H^2)(1 - \beta^2) + \beta^2\omega_0^2}{\beta^2(\omega_0^2 + \omega_H^2 - \omega^2)} \times \right.$$

$$\left. \times \left\{ 1 \pm \frac{\omega_H\left[(\omega^2-\omega_H^2)(1-\beta^2)^2 + \beta^2(3-\beta^2)\omega_0^2\right]}{\left[(\omega^2-\omega_H^2)(1-\beta^2)+\beta^2\omega_0^2\right]\sqrt{(1-\beta^2)^2\omega_H^2+4\beta^2(\omega^2-\omega_0^2)}} \right\} \right| \omega d\omega ; \tag{3}$$

and

$$\cos^2\vartheta = \frac{\left\{2(\omega^2-\omega_0^2)^2\beta^2-\omega_H^2\left[2\beta^2\omega^2+(1-\beta^2)\omega_0^2\right]\right\}\omega^2}{2\beta^2\left\{(\omega^2-\omega_0^2)^2\beta^2-\omega_H^2\omega^2\left[\omega^2\beta^2+(1-\beta^2)\omega_0^2\right]\right\}} \pm$$

$$\pm \frac{\sqrt{4(\omega^2-\omega_0^2)\beta^2+(1-\beta^2)^2\omega_H^2}\,\omega^2}{2\beta^2\left\{(\omega^2-\omega_0^2)^2\beta^2-\omega_H^2\omega^2\left[\omega^2\beta^2+(1-\beta^2)\omega_0^2\right]\right\}}, \tag{4}$$

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In these expressions $\omega_H = eH/mc$; $\omega_0 = (4\pi e^2 N/m)^{1/2}$; $\beta = v_{\parallel}/c$; H is the magnetic field; N is the electron concentration; e and m are the electronic charge and mass respectively; and ϑ is the angle between the direction of propagation of the wave and the magnetic field. Eqs. (3) and (4) strictly hold for a uniformly distributed medium only, although they can be used in the case of the earth's ionosphere since ω_0 and ω_H are slowly varying functions of height. The electron concentration, the magnetic field and the refractive index are assumed to vary as indicated in Fig.1 (cf. legend of Fig.1). Eq.(2) imposes an additional limitation on the dimensions of the emitting region. In fact, it follows from Eq.(4) that, independently of the magnitude of ϑ, the following inequality must be satisfied:

$$\omega_H (1 - \beta^2) \geqslant 4\beta^2 (\omega^2 - \omega_0^2) \qquad (6)$$

If

$$|\omega^2 - \omega_H^2| \leqslant 3\beta^2\omega_0^2, \quad \omega_H^2 \gg 4\beta^2\omega_0^2 \quad \text{and} \quad \beta^2 \ll 1,$$

then it follows from Eq. (3) that:

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$$w \simeq \left| \frac{e^2}{c^2} \frac{\omega^2 - \omega_H^2}{\omega_0^2 + \omega_H^2 - \omega^2} \right| \frac{\omega}{\beta^2} \quad (7)$$

Substituting into this formula the values of ω_H and ω_o corresponding to a height of about 1500 km, it is found that

$$J = (5 \times 10^{-20} q) \text{ w m}^{-2} \text{ cps}^{-1} \text{ sterad}^{-1}.$$

This figure is obtained for the following values of the various parameters involved: $f \sim 0.5$ Mc/s; $\beta^2 = 0.04$ ($E \sim 4.5 \times 10^5$ eV); $\Delta z = 100$ km. When $\beta^2 = 0.01$ ($E = 10^5$ eV) and $\Delta z = 300$ km, it is found that

$$J = (6 \times 10^{-19} q) \text{ w m}^{-2} \text{ cps}^{-1} \text{ sterad}^{-1}.$$

When the flux density $q = 0.1$ the effective temperature of the radiation corresponding to these intensities is found to be 10^5 °K and 1.2×10^6 °K respectively. For $f \sim 5000$ cps, $\beta^2 \sim 0.01$, $\Delta z = 10^4$ km, $q = 0.1$ electron/cm^3 and $f_o \sim 1$ Mc/s

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E032/E114

($N \sim 100$ electron/cm^3) it is found that the effective temperature is 1.6×10^7 °K.

2. Synchrotron radiation. The frequency of synchrotron radiation due to non-relativistic particles is determined by the magnitude of the magnetic field. To each height of the earth's atmosphere there correspond certain definite generation frequencies given by $\omega = s\omega_H$ where $s = 1, 2, 3, \ldots$. The intensity of the harmonics decreases with s, beginning with the second harmonic. It follows that in the case of the ionosphere the predominating frequencies will be of the order of 1-2 Mc/s. It is estimated that for heights of the order of 1500 km above the earth's surface, the second harmonic is $\omega \sim 10^7$ ($f \sim 1.5$ Mc/s). Assuming $\omega_0 \lesssim 10^7$, the intensity of synchrotron radiation on the above frequency is

$$J \sim (10^{-20} q) \text{ w m}^{-2} \text{ cps}^{-1} \text{ sterad}^{-1}$$

(ordinary component, $\beta_\perp^2 \sim 0.3$, $\vartheta \sim 10°$). For $z = 3000$ km ($\omega = 8 \times 10^6$), $\omega_0 = 3 \times 10^{11}$, $\beta_\perp^2 \sim 0.3$ and $\vartheta \sim 20°$, it is found that

$$J \sim (10^{-22} q) \text{ w m}^{-2} \text{ cps}^{-1} \text{ sterad}^{-1}.$$

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Substituting q = 0.1 as in the case of the Cherenkov radiation, the effective temperature in these two cases is found to be 20 000 °K and 200 °K respectively.
There are 1 figure and 15 references: 11 Soviet and 4 English.
The English language references read as follows:

Ref.1: G.R. Ellis. J. Atm. and Terr. Phys., Vol.10, 302, (1957).
Ref.3: G. Reber. J. Geoph. Res., Vol.63, 109 (1958).
Ref.9: J.A. Van Allen, L.A. Frank. Nature, Vol.183, 430 (1959).
Ref.12: R.B. Dyce. J. Geoph. Res., Vol.64. 1163 (1959).

Acknowledgments are expressed to V.L. Ginzburg for discussions.

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete
(Scientific Research Institute of Radiophysics at the Gor'kiy University)

SUBMITTED: October 24, 1960

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00041231(

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3,2310 (1031,1049)
26.1410

31795
S/056/61/041/006/046/054
B109/B102

AUTHOR: Eydman, V. Ya.

TITLE: Emission of a plasma wave by a charge moving in a magnetoactive plasma

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 41, no. 6(12), 1961, 1971-1977

TEXT: The spectral and angular distributions of the energy of a plasma wave emitted by a charge moving in a magnetoactive plasma is determined, spatial dispersion being taken into account. By performing a Fourier transformation and assuming low electron velocities a complex expression A, which can be split up into two parts $A = A_{1,2} + A_3$, is obtained from the Maxwell equations for the energy loss of a charge moving in a plasma. A_3 corresponds to the emission of a longitudinal wave with $n^2 = F/RV\beta_T^2 = n_3^2$ and $A_{1,2}$ to the emission of the ordinary and extraordinary waves. Here $n^2 = k^2c^2/\omega^2$, $F = 1 - u - V + uV\cos^2\theta \gg \beta_T$, $u = \omega_H^2/\omega^2$,

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$\omega_H = eH_0/mc$, $V = \frac{4\pi e^2 N}{m\omega^2} = \omega_0^2/\omega^2$, Θ is the angle between $\vec{k}$ and $\vec{H}_0$,

$R = \frac{3\sin^4\Theta}{1-4u} + \left[1 + \frac{5-u}{(1-u)^2}\right]\sin^2\Theta\cos^2\Theta + 3(1-u)\cos^4\Theta$. $A_{1,2}$ corresponds to the usual emission in a cold plasma. The author therefore discusses only the quantity A_3 which, for $n_3^2 \gg 1$, can simply be written as

$$A_3 = \sum_{s=-\infty}^{\infty} A_3^{(s)} = -\frac{e^2\tau}{c\beta_T^2}\sum_{s=-\infty}^{\infty}\int \frac{J_s^2(\xi)\,|\omega^2-\omega_H^2|\,dx}{Vn_3\,|Rd\,[\omega(1-\beta_0 n_3 x)]/d\omega\,|} =$$
$$= -\frac{e^2\tau}{v_0\omega_0^2\beta_T^2}\sum_{s=-\infty}^{\infty}\int\frac{J_s^2(\xi)\,|\omega^2-\omega_H^2|\,\omega d\omega}{n_3\,|Rd\,(n_3 x)/dx\,|}. \qquad (17),$$

where $x = \cos\Theta$, $\tau = 2\pi/\Omega$, $\Omega = \omega_H\sqrt{1-\beta^2}$, $\vec{v}\left\{-v_1\sin\Omega t;\ v_1\cos\Omega t;\ v_0\right\}$, $\beta^2 = c^{-2}(v_1^2+v_0^2)$, $I_s(\xi)$ is a Bessel function, $\xi = kr_0\sin\Theta$, $\beta_0 = v_0/c$.
Particular cases: A) Cherenkov radiation ($s = 0$);

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$$A_3^{(0)} = -\frac{e^2\tau}{v_0\beta_T^2\omega_0^2}\int\limits_{\beta_T n_3>1}\frac{|\omega^2-\omega_H^2|\,J_0^2(\xi)\,\omega d\omega}{n_3\,|Rd(n_3x)/dx|}. \qquad (19).$$

For a charge moving through an isotropic medium ($\omega_H = 0$, $n_3^2 = (\omega^2 - \omega_0^2)/3\beta_T^2\,\omega_0^2$, $R = 3$) one obtains $A_3^{(o)} = -\frac{e^2\tau}{v_0}\left\{\frac{1}{2}\left[\omega_m^2 - \bar{\omega}^2\right] + \omega_0^2\ln\frac{k_m v_0}{\omega_m}\right\}$, $\bar{\omega}^2 = \omega_0^2\,(1 + 3v_T^2/v_0^2)$. B) A moving oscillator ($s = \pm 1$):

$$A_3^{(\pm1)} = \frac{-p_0^2\tau}{4v_T^2v_0\omega_0^2}\int\frac{|\omega^2-\omega_H^2|\,n_3\sin^2\theta\,\omega^2 d\omega}{|Rd(n_3x)/dx|}, \qquad p_0 = er_0, \qquad (22)$$

is valid in the case $\xi \ll 1$. If $\xi = \beta_1 n_3 \sin\Theta \ll 1$, then

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$$A_3^{(1)} = -\frac{p_0^2\tau\Omega^2|\Omega^2-\omega_H^2|}{4\beta_T^2c^2V}\int\frac{n_3\sin^2\theta\,dx}{|R|}, \qquad p_0 = er_0. \tag{24}$$

is valid. This is the double amount of plasma-wave energy emitted by an oscillator moving perpendicular to $\vec{H}_0$. C) If $|s| = \omega|1-\beta_0 n_3\cos\Theta|/\Omega \gg 1$, and $\beta_1 n_3\sin\Theta/|1-\beta_0 n_3\sin\Theta| \gtrsim 1$,

$$A_3^{|s|\gg 1} = -\frac{2^{2/3}e^2\tau}{\pi c\Omega^{1/3}\beta_1^{2/3}\beta_T^2}\int\frac{d\omega\,dx\,\Phi^2(z)\,|\omega^2-\omega_H^2|}{V(\omega n_3\sin\theta)^{2/3}n_3|R|}. \tag{26}$$

will be valid. Here $\Phi(z)$ is Airy's function. The significance of A_3 for $A_{1,2}$ is finally discussed. When an oscillator moves in an isotropic medium, there may be a situation in which $A_3^{(1)}/A_{1,2}^{(1)} = 1/6\beta_T^3 \gg 1$. Ag. Sitenko, A. A. Kolomenskiy (ZhETF, 30, 511, 1956) and V. D. Shafranov (Elektromagnitnyye volny v plazme, Institut atomnoy energii im. I. V. Kurchatova, AN SSSR, M., 1960 g.) are mentioned. There are 10 Soviet references.

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31795
S/056/61/041/006/046/054
Emission of a plasma wave by a charge ... B109/B102

ASSOCIATION: Radiofizicheskiy institut Gor'kovskogo gosudarstvennogo universiteta (Radiophysical Institute of Gor'kiy State University)

SUBMITTED. July 21, 1961 (initially) September 9, 1961 (after revision)

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Card 5/5

36965

S/141/62/005/001/012/024
E203/E435

9.2571

AUTHORS: Korobkov, Yu.S., Eydmin, V.Ya.

TITLE: The radiation reaction of a moving charge in a waveguide filled with an anisotropic dielectric

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Radiofizika. v.5, no.1, 1962, 122-127

TEXT: A full mathematical treatment is given of the motion of an electric charge in a waveguide filled with an anisotropic dielectric for the case that the axis of symmetry of the crystal is parallel to the waveguide axis, and also the case when it is at right angles thereto. Starting from Maxwell's equations the authors calculate the energy transfers between the particle and the electromagnetic field. The energy equation splits into separate equations: one containing terms due to the rectilinear component of the particle's motion and the other containing those due to the oscillatory component. The first equation gives the Cherenkov effect, the second shows two effects: the first corresponding to an energy loss by the particle (normal Doppler effect) and the second to an energy gain (anomalous Doppler effect).

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S/141/62/005/001/012/024
E203/E435

The radiation reaction ...

If the terms giving the energy loss are now equated to zero, the condition is established under which a growth of oscillations must take place.

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete (Radiophysics Scientific Research Institute at Gor'kiy University)

SUBMITTED: June 9, 1961

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40022
S/141/62/005/003/002/011
E032/E514

3,2310

AUTHOR: Eydman, V.Ya.

TITLE: On the transit radiation at a plasma boundary with allowance for spatial dispersion

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, v.5, no.3, 1962, 478-483

TEXT: It is pointed out that previous workers who considered the emission of electromagnetic waves during the passage of a charged particle through the separation boundary between two media did not take into account spatial dispersion, which may be important, e.g. it may contribute to the emitted energy by giving rise to a longitudinal wave. The phenomenological treatment given by B. L. Zhelnov (Ref.3:* ZhETF, 40, 170, 1961) made use of additional boundary conditions which can only be employed for qualitative estimates. V. M. Yakovenko (Ref.4:† ZhETF, 41, 385, 1961) on the other hand investigated the transit radiation at a plasma boundary with the aid of hydrodynamic equations. In the present paper the transport-equation method is used to solve the problem of the emission of radiation by a charge passing through the plasma-

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On the transit radiation.... S/141/62/005/003/002/011
E032/E514

vacuum boundary. It is assumed that the plasma electrons experience mirror reflection at the boundary. Explicit formulas are obtained for the Fourier components of the field and the amount of radiated energy. These expressions include terms representing the Cherenkov emission of longitudinal waves from the plasma into the vacuum.

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete (Scientific Research Radiophysics Institute of the Gor'kiy University)

SUBMITTED: November 29, 1961

X

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43396

S/141/62/005/005/002/016
E032/E514

24.3500

AUTHOR: Eydman, V.Ya.

TITLE: On the radiation emitted by a charge moving in a non-homogeneous medium

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, v.5, no.5, 1962, 897-900

TEXT: This problem has been considered by a number of workers, all of whom assumed that the charge moves in a layered medium in the direction along which the properties of the medium are variable. However, under cosmic condition, the radiating particles usually move at an angle to this direction. In the present paper the geometric-optics approximation is used to solve this more general problem. The case where the dielectric permittivity ε is a periodic function of one of the coordinates is discussed in detail. The Maxwell equations for the problem are solved on the assumption that ε is a function of a single coordinate only, e.g. $\varepsilon = \varepsilon(z)$. Explicit formulae are obtained for the electric field and the radiated energy.

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On the radiation emitted by ... S/141/62/005/005/002/016
E032/E514

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete (Scientific Research Radiophysics Institute of the Gor'kiy University)

SUBMITTED: March 2, 1962

Card 2/2

EYDMAN, V.Ya.

Attenuation of electromagnetic waves in an inhomogeneous medium related to transient radiation. Zhur. eksp. i teor. fiz. 43 no.4:1419-1423 O '62. (MIRA 15:11)

1. Radiofizicheskiy institut Gor'kovskogo gosudarstvennogo universiteta.

(Electromagnetic waves)
(Plasma (Ionized gases))

BENEDIKTOV, Ye.A.; RAPOPORT, V.O.; EYDMAN, V.Ya.

Study of plasma waves in the ionosphere. Geomag. i aer. 2 no.4: 708-711 Jl-Ag '62. (MIRA 15:10)

1. Radiofizicheskiy institut pri Gor'kovskom gosudarstvennom universitete.

(Ionosphere) (Radio waves)

GINZBURG, V.L.; EYDMAN, V.Ya.

Radiation reaction in the case of media with negative absorption. Zhur. eksp. i teor. fiz. 43 no.5:1865-1871 N '62. (MIRA 15:12)

1. Radiofizicheskiy institut Gor'kovskogo gosudarstvennogo universiteta.

(Masers)
(Quantum theory)

L 10131-63 EWT(1)/BDS--AFFTC/ASD/ESD-3/AFWL--IJP(C)

ACCESSION NR: AP3000166 S/0141/63/006/002/0405/0407

AUTHOR: Gorodinskiy, G. V.; Eydman, V. Ya. 58

TITLE: Radiation from a charge impinging on a metal sphere 21

SOURCE: Izvestiya vysshikh uchebnykh zavedeniy, radiofizika, v. 6, no. 2, 1963, 405-407

TOPIC TAGS: charge radiation, particle/metal-sphere collision

ABSTRACT: A head-on collision of a nonrelativistic charged particle with a metal sphere is examined mathematically. Effect of collision on the radiated energy is considered, and the impossibility of isolating the pre-collision radiation from the total radiation intensity is noted. "The authors are thankful to V. Ye. Pafomov for his comments." Orig. art. has: 9 equations.

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete (Scientific-Research Radiophysics Institute, Gor'kiy University)

SUBMITTED: 18Jun62 DATE ACQ: 12Jun63 ENCL: 00

SUB CODE: PH NR REF SOV: 006 OTHER: 000

Card 1/1 llm/Sm

EYDMAN, V.Ya.

Electromagnetic waves in an inhomogeneous medium permeated by a plasma stream. Izv. vys. ucheb. zav.; radiofiz. 6 no.4:709-714 '63. (MIRA 16:12)

1. Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete.

EYDMAN, V.Ye.

Damping of electromagnetic waves in a plasma placed in an inhomogeneous dielectric. Izv. vys. ucheb. zav.; radiofiz. 6 no.4:852-853 '63. (MIRA 16:12)

1. Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete.

ACCESSION NR: AP4017035 S/0141/63/006/006/1140/1143

AUTHOR: Eydman, V. Ya.

TITLE: Equation of a thin cylindrical antenna in a plasma with allowance for spatial dispersion

SOURCE: IVUZ. Radiofizika, v. 6, no. 6, 1963, 1140-1143

TOPIC TAGS: antenna, thin antenna, antenna in plasma, satellite antenna, spatial dispersion, antenna impedance, plasma wave radiation, longitudinal wave radiation

ABSTRACT: Equations are derived for the excitation of a thin-wire antenna placed in an isotropic plasma, with allowance for spatial dispersion. This is of importance for antennas placed on artificial earth satellites, where allowance must be made for the change that the radiation of the plasma wave introduces in the radiation impedance of the radiator. An equation is derived for the impedance

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ACCESSION NR: AP4017035

of the dipole with allowance for the longitudinal wave it radiates. Applications to the impedance of an antenna placed in a plasma under conditions realized in the earth's ionosphere will be discussed in a separate paper. "The author is grateful to V. O. Rapoport for suggesting the topic and for discussions." Orig. art. has: 11 formulas.

ASSOCIATION: Nauchno issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete (Scientific Research Radiophysics Institute of the Gor'kiy University)

SUBMITTED: 19Feb63 DATE ACQ: 18Mar64 ENCL: 00

SUB CODE: PH, SP NO REF SOV: 007 OTHER: 000

Card 2/2

L 38118-65 EWT(1)/EPF(n)-2/EWG(m)/EEC-4/EPA(w)-2/EWA(h) Pz-6/Po-4/Pab-10/ Peb/Pi-4 IJP(c) WW/AT

ACCESSION NR: AP5006041 S/0141/64/007/006/1214/1216

Author; Eydman, V. Ya.

TITLE: Concerning normal waves in a round waveguide filled with a plasma, with account of spatial dispersion

SOURCE: IVUZ. Radiofizika, v. 7, no. 6, 1964, 1214-1216

TOPIC TAGS: plasma waveguide, plasma wave propagation, spatial dispersion, Cerenkov radiation

ABSTRACT: This investigation was undertaken because spatial dispersion was taken into account hitherto only for infinite or semiinfinite plasma, but under laboratory conditions the plasma is usually in closed systems such as waveguides. In addition to considering the normal modes produced in a round waveguide, the article deals also with the radiation of such modes by elementary radiators such as an oscillator parallel to the waveguide axis or a charge moving with constant velocity along the waveguide axis. The solution of the equation for the electric field intensity is written in the form of a Bessel-function series with the constants determined from the boundary conditions. It is shown that it is possible

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APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00041231(

L 38118-65
ACCESSION NR: AP5006041

to have in a round waveguide waves which normally would not exist without account of the spatial dispersion. The normal modes excited in the waveguides by a specified current are determined from the energy equation. Cerenkov excitation of such a waveguide can be determined as a particular case of these equations. "The author thanks V. L. Ginzburg for a discussion, and also V. B. Gil'denburg and I. G. Kondrat'yev for several remarks." Orig. art. has: 5 formulas.

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete (Scientific-Reasearch Radiophysics Institute at the Gor'kiy University)

SUBMITTED: 19Nov63 ENCL: 00 SUB CODE: EC, ME

NR REF SOV: 003 OTHER: 000

Card 2/2

L 9780-66 EWT(1)/FCC/EWA(h) RB/GW

ACC NR: AP5025482 SOURCE CODE: UR/0203/65/005/005/0930/0931

AUTHOR: Rapoport, V. O.; Eydman, V. Ya.

51
03

ORG: Radiophysical Institute in the Gor'kiy State University (Radiofizicheskiy institut pri Gor'kovskom gosudarstvennom universitete)

TITLE: Radio emission generated in ionosphere during ionization by corpuscular stream

SOURCE: Geomagnetizm i aeronomiya, v. 5, no. 5, 1965, 930-931

TOPIC TAGS: radio wave, radio emission, ionosphere, ionization, solar activity, solar corpuscular radiation

ABSTRACT: Radio emissions of the ionosphere in the decimeter and meter wave bands, observed during the years of maximal solar activity have been mentioned in the literature. These radio emissions were evidently caused by the penetration of corpuscular streams into the earth's ionosphere. They could not be explained by the Cherenkov or synchrotron radiation mechanisms. The phenomenon could, however,

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UDC: 550.388.2

L 9780-66

ACC NR: AP5025482

be explained by the radiation of electrons knocked out of molecules by the fast particles of the corpuscular stream. Assuming that the rate of speed (v) of electrons of the stream was $v \ll c$ (c is the speed of light) and the time of collision $\tau \ll 1/\nu$ (ν is the frequency), it was proven that the intensity of radio emission P (erg./cm^2 sec. ster cycle) could be written as $P = e^2P_e/3mc^2v$ (where e and m are the charge and the mass of the electron) provided the stream of fast electrons, having the stream energy P_e (erg/cm^{2}sec.ster), passed through the ionosphere. According to V. L. Ginsburg (Rasprostranenie elektromagnitnykh voln v plazme. Fizmatgiz, 1960), P could be expressed by an effective temperature (T_{ef}) at the outlet of the receiver as $P = 2K T_{ef}/\lambda^2$; where λ is wavelength and K is the Boltzmann constant. It followed from these 2 expressions that $T_{ef} = 4\lambda^2e^2P_e/3Kmc^2v$. The T_{ef} was calculated as 200K by using data on P_e ($\sim$400 erg./cm.^{2}sec. ster.), obtained by the Injun satellite at λ= 400cm. R. D. Egan and A. M. Peterson (J. Geophys. Res., 1960, 65, 3830.) registered $T_{ef} = 10^3$K, i.e. by 1 order higher than the calculated value. But the data, used in the calculation, were obtained during years of decreased solar activity, whereas the radio emissions of the ionosphere (measured T_{ef}) were observed in 1958, i.e. in the year of maximum solar activity. Orig. art. has: 5 formulas.

SUB CODE: 04,03,17/SUBM DATE: 21Dec64/ NR REF SOV: 003/ OTHER: 007

2/2

EYDMAN, V.Ya.

Emission of a surface wave by a charge crossing the interface between two media. Izv.vys.ucheb.zav.; radiofiz. 8 no.1:188-190 '65. (MIRA 18:6)

1. Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete.

L 1960-66 EWT(1)/ETC/EPF(n)-2/EWG(m)/EPA(w)-2 IJP(c) AT

ACCESSION NR: AP5022789

UR/0141/65/008/004/0655/0658
533.922

AUTHOR: Eydman, V. Ya. 44,55

62
56
B

TITLE: On the relationship between radiation from accelerated charges moving in a medium and wave damping in an inhomogeneous plasma 21,44,55

SOURCE: IVUZ. Radiofizika, v. 8, no. 4, 1965, 655-658

TOPIC TAGS: Cerenkov radiation, electron radiation, inhomogeneous plasma, plasma wave propagation

ABSTRACT: This paper is related to another (ZhTF, in press) by the author, who shows that the Landau damping decreases somewhat when a longitudinal wave propagates in a weakly-inhomogeneous plasma. In the present paper this wave damping is connected with the Cerenkov radiation of electrons accelerated in the plasma by an external static electric field. The calculations consist of determining the emissivity of the plasma by finding the radiation of the accelerated electron in the plasma and then averaging this radiation over the Maxwell distribution. The Cerenkov radiation from the accelerated electron is found to be weaker than that of a uniformly moving electron, since the latter radiates during

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L 1960-66

ACCESSION NR: AP5022789

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its entire time of motion, while the former radiates only so long as its velocity is of the same order as the phase velocity of the wave. It is thus confirmed that the decrease in the Landau damping is produced by this effect. "The author thanks B. M. Bolotovskiy for a comment." Orig. art. has: 7 formulas. [02]

44,55

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete (Scientific Research Radiophysics Institute at the Gor'kiy University) 44,55

SUBMITTED: 20Oct64 ENCL: 00 SUB CODE: ME, NP

NO REF SOV: 003 OTHER: 000 ATD PRESS: 4115

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Card 2/2

L 7730-66 EWT(1)/ETC/EPF(n)-2/EWG(m)/EPA(w)-2 IJP(c) AT

ACC NR: AP5025879 SOUCE CODE: UR/0057/65/035/010/1730/1735

44,55

69
B

AUTHOR: Eydman, V. Ya.

ORG: none

TITLE: On the longitudinal oscillations of a nonuniform plasma

SOURCE: Zhurnal tekhnicheskoy fiziki, v, 35, no. 10, 1965, 1730-1735

21,44,55

TOPIC TAGS: plasma oscillation, inhomogeneous plasma, mathematic physics, kinetic equation, longitudinal wave

ABSTRACT: Longitudinal oscillations of a nonuniform plasma are treated on the basis of a linearized kinetic equation in which the static force responsible for the nonuniformity is retained. The present treatment differs from other, earlier treatments in retaining this static force factor. It is assumed that the length characterizing the plasma nonuniformity is much greater than the wavelength, and the solution of the kinetic equation is sought in the approximation of geometric optics. The zeroth approximation is derived in detail and it is shown how the higher order approximations can be calculated if necessary. It is found that retaining the static force leads to a lower estimate of the Landau damping due to charged plasma particles with velocities close to the phase velocity of the waves. In an appendix an integral that occurs in the expression for the current density, for which an asymptotic expression was derived

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L 7730-66

ACC NR: AP5025879

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in the text, is evaluated in terms of the error function with the aid of a suggestion of N.G.Denisov. Replacing the error function in this integral by its asymptotic expansion, however, leads to a less useful expression for the current density than that derived in the text. The author thanks A.A.Andronov and V.L.Ginsburg for a discussion. Orig. art. has: 25 formulas and 1 figure. 44,55 44,55

SUB CODE: ME/ SUBM DATE: 16Jun64/ ORIG REF: 007/ OTH REF: 001

Card 2/2

L 5346-66 EWT(1)/ETC/EPF(n)-2/EWG(m)/EPA(w)-2 IJP(c) AT
ACCESSION NR: AP5021117 UR/0056/65/049/002/0529/0537
48
45
B

AUTHOR: Eydman, V. Ya. 44,55

TITLE: Concerning damping of longitudinal waves in a non-uniform plasma 21,44,55

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 2, 1965, 529-537

TOPIC TAGS: inhomogeneous plasma, plasma wave propagation, magnetoactive plasma, distribution function, particle distribution

ABSTRACT: This is a continuation of earlier work by the author (Izv. vyssh. uch. zav., Radiofizika v. 6, 852, 1963; ibid., in press; ZhETF v. 43, 1419, 1962; ZhTF, in press), in which the geometrical-optics approximation was employed and it was assumed that neither the particle distribution function nor the properties of the medium change appreciably over a distance on the order of the wavelength. In the present paper an appreciable spatial variation of the number of resonant particles interacting with the longitudinal waves in the plasma is taken into account, and it is shown that this alters radically the character of the damping of the longitudinal wave. It is demonstrated, in particular, that in some cases the spatially-propagating wave does not attenuate, but grows in space. The interaction between the electrons of an inhomogeneous plasma (assumed to have a Maxwellian distribution)

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L 5346-66
ACCESSION NR: AP5021117 3

and the field of a normal longitudinal wave of such a plasma are calculated as an example. Orig. art. has: 29 formulas.

ASSOCIATION: Radioficheskiy institut Gor'kovskogo gosudarstvennogo universiteta (Radiophysics Institute of the Gor'kiy State University) 44,55

SUBMITTED: 12Jan65 ENCL: 00 SUB CODE: ME

NR REF SOV: 007 OTHER: 000

Card 2/2 mf

EYDMAN, M.M.

AID P - 3350

Subject : USSR/Electricity

Card 1/1 Pub. 29 - 8/27

Author : Eydman, M. M., Eng.

Title : Performance of condensate pumps with open valves

Periodical : Energetik, 9, 17-18, S 1955

Abstract : The author gives a brief description of a turbine of the VPT-25 type equipped with a 25 KSTs-8 type condenser with two condensate pumps of the 8 KSD-5 X 3 type. The pumps work with open valves.

Institution : None

Submitted : No date

ORBKHOV, I.N.; BYDOVICH, A.I., master

Electric wiring in steam tunnels. Energetika 8 no.3:17 Mr '60. (MIRA 13:6)
(Electric wiring, Interior)

EYDRIGEVICH, Ye. V.

"Contribution to the Genetics of Color and Spotting innthe Goat," Dokl. AN SSSR, 25, No.9, 1939

EYDRIGEVICH, Ye. V.

Eydrigevich, Ye. V. - "The question of the rold of external and internal factors in development," Trudy Alma-At. vet.-zootekhn. in-ta, Vol. V, 1948, p. 48-52

So: U-3566, 15 March 53, (Letopis 'Zhurnal 'nykh Statey, No. 13, 1949)

EYDRIGEVICH, Ye. V.

Eydrigevich, Ye. V. "The problem of classification of the aboriginal Asiatic goats of the USSR," Trudy Alma-At. vet.-zootekhn. in-ta, Vol. V, 1948, p. 246-51 -- Bibliog: 11 items

So: U-3566, 15 March 53, (Letopis 'Zhurnal 'nykh Statey, No. 13, 1949)

EYDRIGEVICH, Ye.V.; POLYAKOV, Ye.V.

Effect of age of parents upon the characteristics of offspring of the Ala-Tau cattle breed. Zhur.ob.biol. 14 no.6:435-440 N-D '53.

(MLRA 6:11)

(Cattle breeding)

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00041231(

EYDRIGEVICH, Ye. V.

Country : USSR
Category : Farm Animals.
General Problems.
Abs. Jour : Ref Zhur-Biol., No 21, 1958, 96604

Author : Eydrigevich, Ye. V.
Institut. : Kharkov Zootechnical Institute.
Title : The Significance of Physiological Methods in the Evaluation of Farm Animals for Breeding Purposes.

Orig Pub. : Sb. tr. Khar'kovsk. zootekhn. in-t, 1957, 9, 83-101

Abstract : The present state of the problem regarding the interrelation between blood characteristics and certain economically useful qualities of farm animals was examined, as well as the possibility of applying the obtained data in breeding. Pedigree differences in the blood composition of farm animals were established, as well as heightened hematological indicators in intensively growing and large animals. There exists a positive connection between the milk

Card: 1/3

2

Country : USSR
Category : Farm Animals.
General Problems.
Abs. Jour : Ref Zhur-Biol., No 11, 1958, 96604

Author :
Institut. :
Title :

Orig Pub. :

Q

Abstract : yield and the oxidation capacity of the blood. Definite interrelationships are found to exist between blood indicators and the type of build of the animals. Slim, speedy horses have higher indicators than broadly built heavy draught breeds. In slimly built dairy-type cattle the general blood volume and the formed elements are increased, while in the broadly built meat type cattle the red blood [erythrocyte] indicators are higher. The progeny of animals with increased Hb and erythrocyte amounts contained

Card: 2/3

3

EYDRIGEVICH, Yevgeniy Vladislavovich [Eidryhevych, IE.V.], prof., doktor sel'skokhoz.nauk; [redacted].F., kand.sel'skokhoz.nauk, glavnyy red.

[How breeds of farm animals are produced and improved] IAk stvoriuiut'sia ta udoskonaliuiut'sia prody sil's'kohospodars'kykh tvaryn. Kyiv, 1959. 39 p. (Tovarystvo dlia poshyrennia politychnykh i naukovykh znan' Ukrains'koi RSR. Ser.4, no.14) (MIRA 12:12)

(Stock and stockbreeding)

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00041231(

EYDRIGEVICH, Ye.V., prof., doktor sel'skokhozyaystvennykh nauk

Pedigree rating of sires. Zhivotnovodstvo 21 no.11:48-52 N '59
(Bulls) (MIRA 13:3)

EYDRIGEVICH, Ye.V., prof.

Selection under conditions of artificial insemination. Zhivotnovodstvo 24 no.6:62-64 Je '62. (MIRA 17:3)

EYDRYGIEWICZ, Waclawa, dr.

The library of the Maritime Institute. Tech gosp morska 10 no.9:292 S '60. (EEAI 10:3)
(Poland--Libraries)

Eyduk, D.N.

Laws governing deformations.

Title: Seminar on refractory metals, compounds, and alloys (Kiev, April 1963)

Source: Atomnaya energiya, v. 15, no. 3, 1963- 266-267

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00041231(

18.9500 26566 S/126/61/012/002/018/019
15.2240 E032/E514

AUTHORS: Ivensen, V.A., Koval'skiy, A.Ye, Semenovskaya, S.V. and Eyduk, O.N.

TITLE: On the anisotropy of the elastic properties of tungsten monocarbide

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol.12, No.2, pp.299-300

TEXT: In view of the difficulties in the production of single crystals of tungsten monocarbide and the determination of their properties, the present authors have investigated the anisotropy of its elastic properties using a single crystal of WC-Co (10 wt.% cobalt). It is known that reversible (i.e.elastic) thermal stresses occur in two-phase alloys as a result of differences in the thermal expansion coefficients of the two phases. In the present work the absolute magnitude of the stresses was measured using the УРС-50 (URS-50) diffractometer with Co K_{β} radiation. The latter radiation was employed in order to exclude effects associated with the doublet structure of $K_{\alpha 1 \alpha 2}$. The displacement of the "centre of gravity" of the lines

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26566

due to the specimen, relative to the lines due to a free specimen of tungsten carbide, was measured. In addition to this shift, a determination was made of the "structural" width of the β line due to the nonuniformity of the thermal stresses. The width of the lines obtained after the removal of the cobalt phase (by means of hydrochloric acid) was subtracted from the total width, since the removal of cobalt removes the thermal stresses. The subtraction was carried out with the aid of a linear formula. It was found that as the direction of the crystallographic plane approaches the c-axis, the elastic modulus increases. For example, the elastic modulus along the c-axis is greater than that along the a-axis by a factor of 1.5. Assuming a three-dimensional stress state, it is concluded that the tungsten carbide lattice in the alloy is compressed, which is in agreement with all the published models describing thermal stresses in the two-phase system (Ref.2: G. P. Zaytsev, FMM, 1956, 2, No.3, 494; Ref.3: W. Spath: Metall. 1958, No.10; Stahlbau, 1958, 24, No.3; Ref.5: J. Gurland, J.Trans. ASM., 1958, 50, 1063). The cobalt lattice, on the other hand, should be in a stretched state. It is pointed out, however, that